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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/016,416	12/10/2001	Cynthia C. Bamdad	067456-5020US01	1226
67374 7590 06/09/2009 MORGAN, LEWIS & BOCKIUS, LLP ONE MARKET SPEAR STREET TOWER SAN FRANCISCO, CA 94105				
EXAMINER LU, FRANK WEI MIN				
ART UNIT 1634		PAPER NUMBER		
MAIL DATE 06/09/2009		DELIVERY MODE PAPER		

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/016,416
Filing Date: December 10, 2001
Appellant(s): BAMDAD ET AL.

Tao Huang and Robin Silva
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed on March 13, 2009 appealing from the Office action mailed on May 28, 2008.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

5,620,850	Bamdad et al.,	04-1997
5,565,658	Gerpheide et al.,	10-1996
6,096,273	Kayyem et al.,	08-2000
5,770,369	Meade et al.,	06-1998

5,958,791	Roberts <i>et al.</i> ,	09-1999
6,319,670 B1	Sigal <i>et al.</i> ,	11-2001

FJelstad, J. "Flexible Print Circuits" Flexible Circuit Technology (3 d ed. 2007). Exhibit A in the response filed on July 23, 2007.

(9) Grounds of Rejection

Note that the rejections on claims 23 and 25 under 35 U.S.C. 103(a) over Sigal *et al.*, in view of Meade *et al.*, and Roberts *et al.*, as applied to claims 18, 20, 24, and 27 above, and further in view of Kayyem *et al.*, have been withdrawn.

The following ground(s) of rejection are applicable to the appealed claims: 18, 20-25 and 27.

1. Claims 18, 20, 24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sigal *et al.*, (US Patent No.6,319,670 B1, filed on December 23, 1997) in view of Meade *et al.*, (US Patent No. 5,770,369, filed on June 7, 1996) and Roberts *et al.*, (US Patent No. 5,958,791, filed on September 27, 1996).

Sigal *et al.*, teach that method and apparatus for improved luminescence assays using microparticles.

Regarding claims 18, 24, and 27, since Sigal *et al.*, teach a composition comprising (i) a sample, (ii) microparticles (ie., colloidal gold particles) comprised of an electrically conductive material having one or more copies of a first assay-ligand immobilized on its surface and a plurality of ECL moieties immobilized on its surface and (iii) a second assay-ligand immobilized on an electrode wherein said first and second assay-ligands are different in structure and/or specificity (see column 4, last paragraph and column 12, second paragraph) and the ECL

moieties include transition metal complexes (see column 9, first paragraph), and claim 18 does not require that a first binding ligand has an ability to interact with a second binding ligand, Sigal *et al.*, disclose an electrode comprising a first binding ligand (i.e., said second assay-ligand) and a plurality of colloids each comprising: i) a second binding ligand (i.e., said first assay-ligand); and ii) an electron transfer moiety such as a transition metal complex as recited in a) and b) of claim 18 and claim 24. Since Sigal *et al.*, teach that a first assay-ligand and a second assay-ligand are nucleic acids (see column 3, fourth paragraph), Sigal *et al.*, disclose that said first binding ligand is a first nucleic acid and said second binding ligand is a second nucleic acid as recited in claim 27.

Regarding claim 20, Sigal *et al.*, teach that said plurality of colloids comprise a self-assembled monolayer as recited in claim 20 (see column 8, second paragraph).

Sigal *et al.*, do not disclose a substrate comprising an array of electrodes and a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety as recited in a) and c) of claim 18. However, since Sigal *et al.*, teach "[E]CL was measured in electrochemical cells designed to hold 3/16" or 5/16" discs of the composite material (working electrode). The electrode was sealed (with an o-ring) against an aperture to form one surface of the cell. The cell also included counter and reference electrodes. Light emitted from the working electrode surface was measured with a photomultiplier tube (PMT). The potential at the working electrode was controlled with a potentiostat. In a typical ECL experiment, the cell was filled with Assay Buffer and the potential at the working electrode was ramped from 0 V to -0.8V to 2.3 V at a scan rate of 0.1 V/s. The peak ECL signal occurred typically at about 1.0 V. We report the integrated photocurrent measured at the PMT in units of

nA's" (see column 17, second and third paragraphs) and the ECL moieties include transition metal complexes (see column 9, first paragraph), Sigal *et al.*, disclose a detector (e.g., photomultiplier tube) capable of detecting said electron transfer moiety (i.e., ECL comprising transition metal complex) as recited in c) of claim 18.

Meade *et al.*, teach that a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety (see column 27, left column).

Roberts *et al.*, teach advantages of fabricating small electrodes in interdigitated arrays (see column 7, last paragraph bridging to column 8, second paragraph).

Therefore, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have made a composition recited in claim 18 comprising a substrate comprising an array of electrodes (i.e., a plurality of identical electrodes, each has a second assay-ligand) and a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety in view of the patents of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*. One having ordinary skill in the art would have been motivated to do so because Roberts *et al.*, suggest that advantages of fabricating small electrodes in interdigitated arrays "[M]icroelectrodes fabricated in an interdigitated array have inherent advantages in signal detection over more conventional electrode configurations... Scaling down the size of an individual electrode has the advantage of increasing the rate of mass transport, increasing the signal-to-noise (faradaic/charging current) ratio, and decreasing ohmic signal losses... Advantages of fabricating small electrodes in interdigitated arrays go even further by allowing redox cycling of ions back and forth between anode(s) and cathode(s)... This generates much larger currents for detection and allows for the use of extremely small sample volumes" (see

column 8) and the simple replacement of one kind of detector (i.e., the detector capable of detecting the integrated photocurrent associated with electron transfer from said ECL comprising electron transfer moiety taught by Sigal *et al.*, see column 17) from another kind of detector (i.e., the detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety taught by Meade *et al.*,) during the process of making a composition recited in claim 18 would have been, in the absence of convincing evidence to the contrary, *prima facie* obvious to one having ordinary skill in the art at the time the invention was made since the methods capable of detecting an electron transfer moiety are exchangeable (see Meade *et al.*, column 25, fifth paragraph) and the detector capable of detecting the integrated photocurrent associated with electron transfer from said ECL comprising electron transfer moiety taught by Sigal *et al.*, and the detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety taught by Meade *et al.*, are used for the same purpose (i.e., detecting electron transfer of the transition metal complex).

Furthermore, the motivation to make the substitution cited above arises from the expectation that the prior art elements will perform their expected functions to achieve their expected results when combined for their common known purpose. Support for making the obviousness rejection comes from the M.P.E.P. at 2144.06, 2144.07, and 2144.09.

Also note that there is no invention involved in combining old elements in such a manner that these elements perform in combination the same function as set forth in the prior art without giving unobvious or unexpected results. *In re Rose* 220 F.2d. 459, 105 USPQ 237 (CCPA 1955).

2. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sigal *et al.*, in view of Meade *et al.*, and Roberts *et al.*, as applied to claims 18, 20, 24, and 27 above, and further in view of Bamdad *et al.*, (US Patent No. 5,620,850, published on April 15, 1997).

The teachings of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, have been summarized previously, *supra*.

Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, do not disclose that said self-assembling monolayer comprises an alkyl chain as recited in claim 21. However, Sigal *et al.*, teach that a self-assembling monolayer is made by functionalized thiol or silane (see column 8, second paragraph).

Bamdad *et al.*, teach that a self-assembling monolayer is made by alkyl thiol functional groups (see columns 9 and 10).

Therefore, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have made a composition as recited in claim 21 wherein said self-assembling monolayer comprises an alkyl chain in view of the patents of Sigal *et al.*, Meade *et al.*, Roberts *et al.*, and Bamdad *et al.*. One having ordinary skill in the art would have been motivated to do so because Sigal *et al.*, suggest that functionalized thiol is used to make a self-assembling monolayer (see column 8, second paragraph) and Bamdad *et al.*, have successfully made a self-assembling monolayer using one kind of functionalized thiol, alkyl thiol functional groups (see columns 9 and 10). One having ordinary skill in the art at the time the invention was made would have a reasonable expectation of success to make a self-assembling monolayer using one kind of functionalized thiol, alkyl thiol functional groups in view of the patents of Sigal *et al.*, Meade *et al.*, Roberts *et al.*, and Bamdad *et al.*.

3. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sigal *et al.*, in view of Meade *et al.*, and Roberts *et al.*, as applied to claims 18, 20, 24, and 27 above, and further in view of Gerpheide *et al.*, (US Patent No. 5,565,658, published on October 15, 1996).

The teachings of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, have been summarized previously, *supra*.

Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, do not disclose that said substrate is a printed circuit board as recited in claim 22.

Gerpheide *et al.*, teach that the substrate of an electrode array is a printed circuit board (see Figure 3b).

Therefore, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have made a composition as recited in claim 22 wherein said substrate is a printed circuit board in view of the patents of Sigal *et al.*, Meade *et al.*, Roberts *et al.*, and Gerpheide *et al.*. One having ordinary skill in the art would have been motivated to do so because Gerpheide *et al.*, have successfully used a printed circuit board as a substrate to make an array of electrodes and fabrication of electrodes on a printed circuit board would provide an economical and widely available way to make an array of electrodes (see Gerpheide *et al.*, column 5, lines 39-48). One having ordinary skill in the art at the time the invention was made would have a reasonable expectation of success to use a printed circuit board as a substrate in order to make an array of electrodes.

4. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sigal *et al.*, in view of Meade *et al.*, and Roberts *et al.*, as applied to claims 18, 20, 24, and 27 above.

The teachings of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, have been summarized previously, *supra*.

Sigal *et al.*, and Roberts *et al.*, do not disclose that said electrodes are gold as recited in claim 23. However, Meade *et al.*, teach that an electrode is made of conductive material such as gold, vitreous carbon, graphite, and other conductive materials and these electrodes are exchangeable (see column 9, lines 27-39).

Therefore, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have made a composition as recited in claim 23 wherein said electrodes are gold in view of the patents of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*. One having ordinary skill in the art would have been motivated to do so because the simple replacement of one kind of electrode (ie., electrodes taught by Sigal *et al.*) from another kind of electrode (ie., gold electrodes taught by Meade *et al.*) during the process of making a composition recited in claim 23 would have been, in the absence of convincing evidence to the contrary, *prima facie* obvious to one having ordinary skill in the art at the time the invention was made since Meade *et al.*, suggest that different electrodes are exchangeable (see column 9, lines 27-39).

Furthermore, the motivation to make the substitution cited above arises from the expectation that the prior art elements will perform their expected functions to achieve their expected results when combined for their common known purpose. Support for making the obviousness rejection comes from the M.P.E.P. at 2144.06, 2144.07, and 2144.09.

Also note that there is no invention involved in combining old elements in such a manner that these elements perform in combination the same function as set forth in the prior art without giving unobvious or unexpected results. *In re Rose* 220 F.2d. 459, 105 USPQ 237 (CCPA 1955).

5. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sigal *et al.*, in view of Meade *et al.*, and Roberts *et al.*, as applied to claims 18, 20, 24, and 27 above.

The teachings of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*, have been summarized previously, *supra*.

Sigal *et al.*, and Roberts *et al.*, do not disclose that said transition metal complex is ferrocene as recited in claim 25.

Meade *et al.*, teach that electron transfer moieties are different transition metal complexes such as ferrocene. These different transition metal complexes are exchangeable (see column 25, lines 7-20).

Therefore, it would have been *prima facie* obvious to one having ordinary skill in the art at the time the invention was made to have made a composition recited in claim 25 wherein said transition metal complex is ferrocene in view of the patents of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*. One having ordinary skill in the art would have been motivated to do so because Meade *et al.*, have successfully used ferrocene as an electron transfer moiety and the simple replacement of one kind of transition metal complex (ie., a transition metal complex taught by Sigal *et al.*,) from another kind of transition metal complex (ie., a transition metal complex such as ferrocene taught by Meade *et al.*,) as an electrode transfer moiety during the process of making a composition recited in claim 25 would have been, in the absence of convincing

evidence to the contrary, *prima facie* obvious to one having ordinary skill in the art at the time the invention was made since Meade *et al.*, suggest that electron transfer moieties for attaching to a nucleic acid are exchangeable (see column 25, lines 7-20).

Furthermore, the motivation to make the substitution cited above arises from the expectation that the prior art elements will perform their expected functions to achieve their expected results when combined for their common known purpose. Support for making the obviousness rejection comes from the M.P.E.P. at 2144.06, 2144.07, and 2144.09.

Also note that there is no invention involved in combining old elements in such a manner that these elements perform in combination the same function as set forth in the prior art without giving unobvious or unexpected results. *In re Rose* 220 F.2d. 459, 105 USPQ 237 (CCPA 1955).

(10) Response to Argument

The major argument between appellant and the examiner is based on whether electrochemiluminescence (ECL) is associated with electron transfer.

I. In page 5, second paragraph bridging to page 6, third paragraph of the Brief on Appeal, appellant argued that: (1) “[R]oberts does not teach ‘an array of working electrodes’ or electrodes that form an array. Instead, *Roberts* teaches two electrodes, each comprises an array of fingers, and the fingers are only part a single working electrode system”; and “[R]oberts only discloses ‘small electrodes’ and the additional advantage of ‘fabricating small electrodes in interdigitated arrays.’ The ‘array’ of *Roberts* refers to is an array of ‘fingers’ of each electrode; it does NOT refer to an array of electrodes, nowhere does *Roberts* disclose an array of electrodes. The advantages of ‘increasing the size of mass transport, increasing the signal-to-noise

(faradaic/charging current) ratio, and decreasing ohmic signal losses' are in reference to the small scale of the *Roberts* electrodes, rather than to any configuration of working electrodes. Therefore, and contrary to the Examiner's assertion, *Roberts* does not teach the motivation for forming an array of working electrodes".

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection. First, since *Roberts et al.*, teach "[I]nterdigitated electrode arrays for liposome-enhanced immunoassay and test device" (see Title of the patent from *Roberts et al.*) and "[F]IG. 2a is an enlarged view of an interdigitated electrode array as shown in FIG. 1" (see column 8, lines 44 and 45), *Roberts et al.*, disclose an array of working electrodes as recited in claim 18. Second, since *Roberts et al.*, teach that "[E]ach conductor (or electrode) comprises a plurality of fingers disposed on the absorbent material, and interdigitated with the fingers of the other conductor" (see column 9, second paragraph), "[A] preferred interdigitated array consists of 125 pair of 3 μm wide microelectrode fingers separated by a 1-5 μm gap" and "[T]he electrode fingers can be spaced from about 0.5 μm to about 10 μm apart" (see column 24, first and second paragraphs), appellant's argument "[T]he 'array' of *Roberts* refers to is an array of 'fingers' of each electrode; it does NOT refer to an array of electrodes, nowhere does *Roberts* disclose an array of electrodes" is incorrect. Third, although *Roberts et al.*, suggest that advantages of fabricating small electrodes in interdigitated arrays "[M]icroelectrodes fabricated in an interdigitated array have inherent advantages in signal detection over more conventional electrode configurations... Scaling down the size of an individual electrode has the advantage of increasing the rate of mass transport, increasing the signal-to-noise (faradaic/charging current) ratio, and decreasing ohmic signal losses... Advantages of fabricating small electrodes in

interdigitated arrays go even further by allowing redox cycling of ions back and forth between anode(s) and cathode(s)... This generates much larger currents for detection and allows for the use of extremely small sample volumes” (see column 8), **claim 18 does not require that working electrodes are not small working electrodes**. Furthermore, the word “small” is a relative term, **claim 18 does not indicate the size of working electrodes**.

II. In page 7, fourth paragraph bridging to page 10, first paragraph of the Brief on Appeal, appellant argued that: (1) “[T]he proposed modification or combination of *Sigal* with other references would change the principle of operation of *Sigal*” since “[T]he present invention is directed to the detection of electrons (detecting transfer using ‘a detector that is capable of detecting a voltage’), which is different from *Sigal* that teaches the detection of photon (electrochemiluminescence). *Sigal* is directed to compositions and methods used to measure the presence of analyte by measuring electrochemiluminescence triggered by a voltage imposed on a working electrode. See col. 1, lines 15 - 19 and lines 48-49. In electrochemiluminescence assays, a reactive species is reduced and thus placed in an excited state. Upon relaxation, a photon is emitted and detected by a photomultiplier tube (PMT). This is in contrast to electron transfer, which is detected using a detector that is capable of detecting voltage rather than photons. The Examiner fails to distinguish between detection of photons (electrochemiluminescence) and detection of electrons (electron transfer)”, “[R]eviewing *Sigal* immediately shows that *Sigal* is specifically and solely directed to electrochemiluminescence that is based on the detection of photons, rather than electrons”, and “although the photons are detected by detecting electrons, those electrons are produced due to photoelectric effect (the generation of electrons when

photons strike a photocathode material in the PMT), not due to electron transfer. These two concepts are quite different. Adding the detector of *Meade* to *Sigal* would result in no signal- the assay would be inoperable, and in fact, changing the operability of *Sigal*, thus 'change the principle of operation.' The same is true of the reverse situation"; and (2) "[T]he proposed modification of Sigal in view of Meade would render the assays of Sigal unsatisfactory for their intended purpose" since "[C]laim 18 recites 'a detector capable of detecting a voltage associated with electron transfer from said electron transfer moiety.' Thus, the detector of claim 18 does not detect photons. Therefore, the ligand binding according to Sigal could not be detected.

Accordingly, the compositions and methods for conducting electrochemiluminescence binding assays of Sigal would not achieve their intended purpose if the detector of claim 18 replaced the photomultiplier tube in Sigal. Because the modification proposed by the Examiner will render the binding assays of *Sigal* unsatisfactory for their intended purpose, there is no suggestion or motivation to make the proposed modification".

Note that Sigal *et al.*, teach all limitations recited in claim 18 except a substrate comprising an array of electrodes and a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety as recited in a) and c) of claim 18. However, since Sigal *et al.*, teach "[E]CL was measured in electrochemical cells designed to hold 3/16" or 5/16" discs of the composite material (working electrode). The electrode was sealed (with an o-ring) against an aperture to form one surface of the cell. The cell also included counter and reference electrodes. Light emitted from the working electrode surface was measured with a photomultiplier tube (PMT). The potential at the working electrode was controlled with a potentiostat. In a typical ECL experiment, the cell was

filled with Assay Buffer and the potential at the working electrode was ramped from 0 V to -0.8V to 2.3 V at a scan rate of 0.1 V/s. The peak ECL signal occurred typically at about 1.0 V. We report the integrated photocurrent measured at the PMT in units of nA's" (see column 17, second and third paragraphs) and the ECL moieties include transition metal complexes (see column 9, first paragraph), Sigal *et al.*, disclose a detector (e.g., photomultiplier tube) capable of detecting said electron transfer moiety (ie., ECL comprising transition metal complex) as recited in c) of claim 18.

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection. First, since Sigal *et al.*, teach that "[E]CL was measured in electrochemical cells designed to hold 3/16" or 5/16" discs of the composite material (working electrode). The electrode was sealed (with an o-ring) against an aperture to form one surface of the cell. The cell also included counter and reference electrodes. Light emitted from the working electrode surface was measured with a **photomultiplier tube** (PMT). The potential at the working electrode was controlled with a potentiostat. In a typical ECL experiment, the cell was filled with Assay Buffer and the potential at the working electrode was ramped from 0 V to -0.8V to 2.3 V at a scan rate of 0.1 V/s. **The peak ECL signal occurred typically at about 1.0 V. We report the integrated photocurrent measured at the PMT in units of nA's"** (see column 17, second and third paragraphs) and the ECL moieties include transition metal complexes (see column 9, first paragraph), Meade *et al.*, teach that **"electrochemiluminescence is used as the basis of the electron transfer detection.** With some electron transfer moieties such as Ru²⁺(bpy)₃, direct luminescence accompanies excited state decay. Changes in this property are associated with nucleic acid hybridization and can be monitored with a simple **photomultiplier**

tube arrangement" (see column 26, lines 62-67 and column 27, line 1), and **it is known that electrochemiluminescence (ECL) process includes electron transfer (see attached ELC Diagram in the office action mailed on September 27, 2007), Sigal *et al.*, disclose electron transfer** and a detector (e.g., photomultiplier tube) capable of detecting said electron transfer moiety (ie., ECL comprising transition metal complex) by producing **voltages** and measuring the integrated photocurrent. Furthermore, since Meade *et al.*, teach a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety (see column 27, left column), the detector capable of detecting the integrated photocurrent associated with electron transfer from said ECL comprising electron transfer moiety taught by Sigal *et al.*, and the detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety taught by Meade *et al.*, are used for the same purpose (ie., detecting electron transfer of the transition metal complex) and the replacement of the detector capable of detecting the integrated photocurrent associated with electron transfer from said ECL comprising electron transfer moiety taught by Sigal *et al.*, from the detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety taught by Meade *et al.*, during the process of making a composition recited in claim 18 would not change the principle of operation of the composition and the intended purpose or uses of Sigal *et al.*, because the method of Sigal *et al.*, is used for detecting binding of analyte to its ligand immobilized on an electrode (see claim 4 in column 22) by detecting electron transfer of an electron transfer moiety, ECL is one of ways for detecting electron transfer and the detector taught by Meade *et al.*, is capable of detecting binding of analyte to its ligand immobilized on an electrode by detecting electron transfer of an electron transfer moiety. In addition, Meade *et al.*, suggest that the

methods capable of detecting an electron transfer moiety are exchangeable (see column 25, fifth paragraph).

III. In page 10, second to fifth paragraphs of the Brief on Appeal, appellant argued that “[T]here is no a reasonable expectation of success by combining *Sigal* with *Meade*” since “[C]laim 18 recites ‘a detector capable of detecting a voltage associated with electron transfer from said electron transfer moiety.’ Because the detector of claim 18 does not detect photons, the ligand binding according to *Sigal* would not be detected. Therefore there is no reasonable expectation of success by combining *Sigal* with *Meade*, and the claimed invention is not obvious”.

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection. First, appellant has no evidence to show that only way for detecting ligand binding is by detecting photons. In fact, the principle of detecting ligand binding by electrochemiluminescence (ECL) measurement taught by *Sigal et al.*, is by detecting electron transfer from said electron transfer moiety and one having ordinary skill in the art at time the invention was made knows that various different ways can be used for detecting electron transfer (see *Meade et al.*, column 26, lines 62-67 and column 27). Second, appellant has no evidence to show that “there is no reasonable expectation of success by combining *Sigal* with *Meade*”. Third, MPEP 2141 (II) (C) states that “‘A person of ordinary skill in the art is also a person of ordinary creativity, not an automaton.’ KSR, 550 U.S. at ___, 82 USPQ2d at 1397. ‘[I]n many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle.’ Id. Office personnel may also take into account “the inferences and creative

steps that a person of ordinary skill in the art would employ.”Id. at ___, 82 USPQ2d at 1396.”.

Since Roberts *et al.*, suggest that advantages of fabricating small electrodes in interdigitated arrays “[M]icroelectrodes fabricated in an interdigitated array have inherent advantages in signal detection over more conventional electrode configurations... Scaling down the size of an individual electrode has the advantage of increasing the rate of mass transport, increasing the signal-to-noise (faradaic/charging current) ratio, and decreasing ohmic signal losses...

Advantages of fabricating small electrodes in interdigitated arrays go even further by allowing redox cycling of ions back and forth between anode(s) and cathode(s)... This generates much larger currents for detection and allows for the use of extremely small sample volumes” (see column 8), Roberts *et al.*, teach the motivation to form an array of working electrode recited in claim 18. Since Sigal *et al.*, teach working electrodes as recited in claim 18 and Meade *et al.*, teach that a detector capable of detecting the voltage associated with electron transfer from said electron transfer moiety (see column 27, left column), it would have been obvious to one having ordinary skill in the art at the time the invention was made to have made a composition recited in claim 18 with reasonable expectation of success in view of the patents of Sigal *et al.*, Meade *et al.*, and Roberts *et al.*.

IV. In page 10, sixth paragraph bridging to page 11, second paragraph of the Brief on Appeal, appellant argued that: (1) “[C]laim 21 depends from claim 18 which recites ‘an array of working electrodes.’ As presented above, Sigal, Meade and Roberts in combination do not teach ‘an array of working electrodes.’ There is also no motivation to combine Sigal with Meade or Roberts because the proposed modification would change the principle of operation of Sigal, render the

assays of *Sigal* unsatisfactory for their intended purpose, and there is no reasonable expectation of success by combining *Sigal* with *Meade*. These defects are not cured by *Bamdad*"; and (2) "*Bamdad* is directed toward derivatized surfaces for surface plasmon resonance experiments. *See* col. 1, 11. 11-12. The Examiner cites *Bamdad* only for the disclosure 'that a self-assembling monolayer is made by alkyl thiol functional groups (see columns 9 and 10).' *See* page 10 of the Office Action. Thus *Bamdad* does not teach 'an array of working electrodes,' nor does it provide the motivation to combine the references".

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection. First, appellant' argument "[S]igal, *Meade* and *Roberts* in combination do not teach 'an array of working electrodes.' There is also no motivation to combine *Sigal* with *Meade* or *Roberts* because the proposed modification would change the principle of operation of *Sigal*, render the assays of *Sigal* unsatisfactory for their intended purpose, and there is no a reasonable expectation of success by combining *Sigal* with *Meade*" is incorrect (see above Response to Arguments (I) to (III)) and the patent from *Bamdad et al.*, is not used to cure the deficiencies of the references as argued by appellant. Second, there is a motivation to combine *Bamdad et al.*, with *Sigal et al.*, *Meade et al.*, and *Roberts et al.*, (see above Rejection Item NO 2).

V. In page 11, third paragraph bridging to page 13, first paragraph of the Brief on Appeal, appellant argued that: (1) "[C]laim 22 depends from claim 18 which recites 'an array of working electrodes.' As presented above, *Sigal*, *Meade* and *Roberts* in combination do not teach 'an array of working electrodes.' There is also no motivation to combine *Sigal* with *Meade* or *Roberts*

because the proposed modification would change the principle of operation of *Sigal*, render the assays of *Sigal* unsatisfactory for their intended purpose, and there is no a reasonable expectation of success by combining *Sigal* with *Meade*. These defects are not cured by *Gerpheide*"; (2) "[G]*erpheide* is directed to an apparatus and method for a capacitance-based proximity sensor with interference rejection. See Abstract. The Examiner cites *Gerpheide* for the disclosure that it teaches 'that the substrate of an electrode array is a printed circuit board (see Figure 3b).' Office Action, at page 11. Thus *Gerpheide* does not teach 'an array of working electrodes,' nor does it provide the motivation to combine the references"; (3) "even assuming, *arguendo*, that *Roberts* teaches an array of working electrodes, *Gerpheide* still explicitly teaches away from *Roberts* because *Roberts* teaches that its device 'includes an absorbent material,' and in contrast, *Gerpheide* teaches that the electrode array using materials that are not an absorbent material"; and (4) "[O]ne of skill in the art would understand that sheet metal and metal foil are not absorbent materials. Furthermore, one of skill in the art would understand that substrates used in flex circuits are preferably not absorptive. See Joseph Fjelstad, Flexible Circuit Technology 43 (3ded. 2007) (attached as Exhibit A in the previous response; 'Moisture absorption is definitely not desirable for any flexible substrate. Moisture can negatively impact both the manufacturing process (by causing delamination, in process or in assembly) and the performance of the finished product (by altering the material's dielectric constant and increasing signal loss.))' Therefore, *Gerpheide* explicitly teaches away from *Roberts* because *Roberts* teaches that its device 'includes an absorbent material,' and in contrast, *Gerpheide* teaches that the electrode array may utilize a flexible printed circuit board, such as a flex circuit, or stampings of sheet metal, which are not absorbent materials".

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection. First, appellant' argument "[S]igal, *Meade* and *Roberts* in combination do not teach 'an array of working electrodes.' There is also no motivation to combine *Sigal* with *Meade* or *Roberts* because the proposed modification would change the principle of operation of *Sigal*, render the assays of *Sigal* unsatisfactory for their intended purpose, and there is no a reasonable expectation of success by combining *Sigal* with *Meade*" is incorrect (see above Response to Arguments (I) to (III)) and the patent from Gerpheide *et al.*, is not used to cure the deficiencies of the references as argued by appellant. Second, although the examiner agrees with appellant that "sheet metal and metal foil are not absorbent materials", the rejection is not based on the replacement of absorbent materials from sheet metal and metal foil as argued by appellant. Regarding the rejection of claim 18, *Roberts et al.*, teach advantages of fabricating small electrodes in interdigitated arrays (see column 7, last paragraph bridging to column 8, second paragraph) and the examiner does not indicate that the array recited in claim 18 must comprise absorbent materials in the device of *Roberts et al.*, as argued by appellant.

VI. In page 13, second to fourth paragraphs of applicant's remarks, appellant argues that "[B]oth the instant application and the *Kayyem* patent were, at the time the invention of the instant invention was made, owned by Clinical Micro Sensors, Inc, which was acquired by Osmetch Technology Inc., the current assignee, in 2004. The assignment of the *Kayyem* patent is recorded in Reel/Frame 008406/0741, 008757/0001, 010225/0614, and 021924/0376. The instant application is a continuation of U.S. Appl. No. 09/428,155, issued as U.S. Patent No. 6,541,617 (allowed by the same Examiner), the assignment of which is recorded in Reel/Frame

010625/0568 and 021924/0376. Therefore, according to U.S.C. § 103(c)(1), *Kayyem* cannot preclude patentability of the presently claimed invention under U.S.C. § 103. Accordingly, the rejections of claim 23 and 25 are improper and should be reversed”.

After carefully these arguments, the examiner agrees to withdraw the rejections on claims 23 and 25 under 35 U.S.C. 103(a) over *Sigal et al.*, in view of *Meade et al.*, and *Roberts et al.*, as applied to claims 18, 20, 24, and 27 above, and further in view of *Kayyem et al.* In fact, in the office action mailed on May 28, 2008, the examiner has indicated that “[I]f applicant can provide an assignment to show that the instant application 10/016,416 and *Kayyem* patent were, at the time the invention of 10/016,416 was made, owned by Clinical Micro Sensors, Inc., the examiner agrees to withdraw the rejections on claims 23 and 25 based on the combination of *Sigal et al.*, *Meade et al.*, *Roberts et al.*, and *Kayyem et al.*, (see page 16 of the office action mailed on May 28, 2008).

VII. In page 13, fifth paragraph bridging to page 16, second paragraph of applicant's remarks, appellant argues that “[C]laims 23 and 25 depend from claim 18 which recites ‘an array of working electrodes.’ As presented above, *Sigal*, *Meade* and *Roberts* in combination do not teach ‘an array of working electrodes.’ There is also no motivation to combine *Sigal* with *Meade* or *Roberts* because the proposed modification would change the principle of operation of *Sigal*, render the assays of *Sigal* unsatisfactory for their intended purpose, and there is no a reasonable expectation of success by combining *Sigal* with *Meade*”.

These arguments have been fully considered but they are not persuasive toward the withdrawal of the rejection because appellant’ argument “[S]*igal*, *Meade* and *Roberts* in combination do not teach ‘an array of working electrodes.’ There is also no motivation to

combine *Sigal* with *Meade* or *Roberts* because the proposed modification would change the principle of operation of *Sigal*, render the assays of *Sigal* unsatisfactory for their intended purpose, and there is no a reasonable expectation of success by combining *Sigal* with *Meade*” is incorrect (see above Response to Arguments (I) to (III)).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner’s answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Frank W Lu /
Primary Examiner, Art Unit 1634
June 4, 2009

Conferees:

/JD Schultz/

Supervisory Patent Examiner, Art Unit 1635

/Joseph T. Woitach/

Supervisory Patent Examiner, Art Unit 1633